



CERTIFICATE OF MAILING  
37 C.F.R. §1.8

I hereby certify that this correspondence is being deposited with the U.S. Postal Service with sufficient postage as First Class Mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-01450, on the date below:

November 3, 2003  
Date

Steven L. Highlander

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

*In re* Application of:  
Sujata KALE and  
Michael W. LONG

Serial No.: 09/753,043

Filed: December 27, 2000

For: PROCESS FOR EX VIVO FORMATION  
OF MAMMALIAN BONE AND USES  
THEREOF

Group Art Unit: 1636

Examiner: Jean C. Witz

Atty. Dkt. No.: UMIC:048US/SLH

DECLARATION OF MICHAEL LONG UNDER 37 C.F.R. § 1.132

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-01450

Dear Sir:

1. I am a citizen of the United States of America, residing at 570 High St., Northville MI 48167.

2. I am the Michael W. Long named as an inventor on the above-captioned patent application. I have been conducting research in the area of bone formation and repair for 18 years. A copy of my *curriculum vitae* is attached.

3. Based on a review of the Office Action mailed on April 4, 2003, it is my understanding that the examiner for above-captioned application has suggested that the bone "nodules" or "globules" described in U.S. Patent 6,152,964 are the same as the bone spheroids of the instant application. However, I believe the examiner to be incorrect in this supposition. The following paragraphs set forth facts that support my position.

4. First, the '964 patent requires that the cells be grown on a substrate (Summary; column 2, line 51). The tissue-like aggregates that we grow (referred to as bone cell spheroids) do not require a substrate. Rather, the cells are induced to grow as tissue-like aggregates without a need for structural support.

5. Second, there is a considerable difference in the size of bone cell spheroids and what the '964 nodules. FIGS. 1 and 4 in the '964 patent are SEM photos. Thus, the material they are describing is, by definition, sub-microscopic. The bone cell spheroids we develop as part of this invention consist of 10,000 to 100,000+ cells. They are thus much larger in size. Likewise the bone synthesized by the cells of the spheroid is larger than the structures apparent in FIGS. 1 and 4 of the '964 patent.

6. Third, the '964 patent clearly states that ascorbic acid,  $\beta$ -glycerol phosphate, and dexamethasone are "essential for the production of bone-like tissue" (column 4, line 27). These substances are not required for the production of bone cell spheroids, nor are they required for the formation of bone by these cells.

7. Fourth, the '964 patent uses undifferentiated bone marrow cells (Summary; column 2, lines 40, 51, 61; column 4, line 21; Claims), and in particular stromal cells (column 2, line 48). The present application specifically uses differentiated bone cells (both preosteoblasts

and osteoblasts). These are specifically isolated from bone fragments in which the bone marrow cells are washed away, and further removed by collagenase treatment.

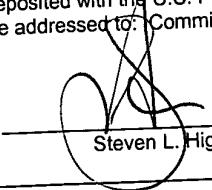
8. Based on the points set forth above, I believe that it is quite clear that the bone nodules of the '964 patent are distinct from the bone cell spheroids of the present application.

9. I hereby declare that all statements made herein of my knowledge are true and that all statements made herein on information and belief are believed to be true; and further, that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment or both, under § 1001 of Title 18 of the U.S. Code, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

10/31/03  
Date

Michael W. Long, Ph.D.  
Michael W. Long, Ph.D.



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<u>November 3, 2003</u> Date	 Steven L. Highlander

PATENT

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*In re* Application of:  
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Michael W. LONG

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OF MAMMALIAN BONE AND USES  
THEREOF

Group Art Unit: 1636

Examiner: Jean C. Witz

Atty, Dkt. No.: UMIC:048US/SLH

Hon. Commissioner for Patents  
Washington, D.C. 20231

Dear Sir:

1. I am a citizen of the United States of America, residing at 76 Perkins St., Jamaica Plain, Massachusetts.

2. I currently hold the position of Professor of Orthopedic Surgery, Harvard Medical School, and Professor of Oral and Maxillofacial Surgery, Harvard School of Dental Medicine,

Boston, Massachusetts. I have been conducting research in the areas of skeletal physiology, pathophysiology and repair for 30 years. A copy of my *curriculum vitae* is attached.

3. I am a compensated member of the Scientific Advisory Board for the licensee of

the above-captioned application, Velcura Therapeutics.

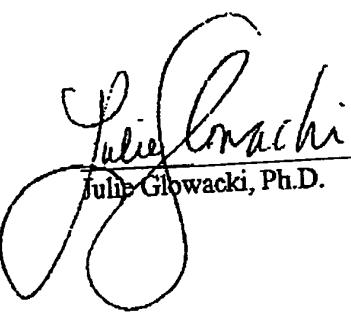
4. I have received the application and pending claims for the above-captioned application of Long and Kale, as well as that portion of the Office Action mailed on April 4, 2003 that deals with U.S. Patent 6,152,964. From these items, it is my understanding that the examiner for above-captioned application has suggested that the bone "nodules" or "globules" described in U.S. Patent 6,152,964 are the same as the bone spheroids of the instant application. However, I believe the examiner to be incorrect in this supposition. The following paragraphs set forth facts that support my position.

5. First, the '964 patent requires use of undifferentiated marrow cells, which are very different from the differentiated cells defined in the instant application at page 13. Second, the '964 patent requires ascorbic acid and dexamethasone to induce formation of macroscopic bone nodules, whereas the instant application does not require such for the formation of bone spheroids. Third, the '964 patent requires a substrate, upon which nodules are formed and with which the nodules are co-implanted, whereas the instant application does not require a support for bone spheroids. And fourth, the '964 patent does not utilize "serum free" conditions to achieve formation of spheroids by bone precursor cells.

6. I hereby declare that all statements made herein of my knowledge are true and that all statements made herein on information and belief are believed to be true; and further, that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment or both, under § 1001 of Title 18 of the U.S. Code, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Oct 14, 2013

Date

  
Julie Glowacki

Julie Glowacki, Ph.D.

# CURRICULUM VITAE

## PART I: General Information

**DATE PREPARED:** September, 2003

**Name:** Julie Glowacki

**Citizenship:** USA

**Office Addresses:** Orthopedic Research  
Brigham and Women's Hospital  
75 Francis Street  
Boston, MA 02115  
617-732-6855

**E:Mail:** jglowacki@rics.bwh.harvard.edu

**FAX:** 617-732-6937

**Home Address:** 76 Perkins Street  
Jamaica Plain, MA 02130

**Place of Birth:** Boston, MA

### **Education:**

1966 B.A. Biology & Chemistry, Boston University (cum laude)  
1973 Ph.D. Biological Chemistry, Harvard University

### **Postdoctoral Training:**

1972-1974 Research Fellow in Medicine, Endocrine Unit,  
Massachusetts General Hospital and Harvard Medical School

### **Academic Appointments:**

1974-1976	Associate in Medicine, Harvard Medical School
1975-1976	Research Fellow in Surgery, Harvard Medical School
1975-1978	Associate in Biological Chemistry, Harvard Medical School
1977-1982	Research Associate, Department of Surgery, Harvard Medical School
1982-1988	Assistant Professor, Department of Surgery, Harvard Medical School
1983-1987	Associate Research Biologist, Department of Medicine, University of California at San Diego (Concurrent Appointment)
1989-2002	Associate Professor, Department of Orthopedic Surgery, Harvard Medical School
1995-2002	Associate Professor, Department of Oral and Maxillofacial Surgery, Harvard School of Dental Medicine

1998-2002	Program Director, Oral and Maxillofacial Surgery Foundation Student Research Training Award, Harvard School of Dental Medicine
2003	Professor of Orthopedic Surgery, Harvard Medical School
2003	Professor of Oral and Maxillofacial Surgery, Harvard School of Dental Medicine

#### **Hospital Appointments:**

1974-1976	Associate in Medicine (Endocrine), Massachusetts General Hospital, Boston, MA
1975-1976	Research Fellow in Plastic Surgery, Peter Bent Brigham Hospital, Boston, MA
1975-1977	Senior Scientist and Administrative Director, Bay Biochemical Research, Boston, MA
1976-1977	Assistant in Biochemistry, Endocrine Unit, Massachusetts General Hospital, Boston, MA
1977-1988	Director, Demineralized Bone Bank, Children's Hospital, Boston, MA
1977-1988	Research Associate in Surgery, Children's Hospital, Boston, MA
1982-1987	Research Biologist, Scripps Institute of Oceanography, La Jolla, CA (Concurrent Appointment)
1982-1987	Research Biologist, Veteran's Administration Medical Center, La Jolla, CA (Concurrent Appointment)
1988-	Senior Investigator, Department of Orthopedic Surgery, Brigham and Women's Hospital, Boston, MA
1995-2000	Director, Skeletal Biology Research Center, Massachusetts General Hospital, Boston, MA
1995-2002	Biologist, Oral and Maxillofacial Surgery Service, Massachusetts General Hospital
1996-	Director, Skeletal Biology, Department of Orthopedic Surgery, Brigham and Women's Hospital, Boston, MA
2002-	Affiliate Biologist, Oral and Maxillofacial Surgery Service, Massachusetts General Hospital

#### **Other Professional Positions and Major Visiting Appointments:**

1976-1977	Visiting Scientist, University of Mexico and Instituto National de Nutricion, Mexico City, Mexico
1982-1983	Visiting Investigator, Salk Institute, La Jolla, CA

#### **Major Administrative Responsibilities:**

1995-2000	Director, Skeletal Biology Research Center, Massachusetts General Hospital, Boston, MA
1996-	Director, Skeletal Biology, Department of Orthopedic Surgery, Brigham and Women's Hospital, Boston, MA

#### **Major Local Committee Assignments:**

**Harvard University:**

2001-2002 Standing Committee on Higher Degrees in Dental Medicine

**Medical School/School of Dental Medicine:**

1986-1988 Faculty Member, Fuller Albright Society  
1994- Research Committee, Harvard Combined Orthopedic Program  
1996-2001 Harvard School of Dental Medicine, Research Committee  
1997-1999 Harvard School of Dental Medicine, Predoctoral Research Committee  
1998- Harvard Combined Orthopedic Residency Core Curriculum Committee  
1998- Harvard Combined Orthopedic Residency Selection Committee  
1998- Alumni/ae Working Group, Harvard Division of Medical Sciences  
1999 Harvard School of Dental Medicine, Search Committee, Department of Growth and Development  
1999-2002 Organizer, Division of Medical Sciences Symposia, HMS Graduation/Reunion Week

**Brigham and Women's Hospital Major Committee Assignments:**

1991-1993 Committee on Research on Women's Health, Brigham and Women's Hospital  
1996-2001 Brigham and Women's Hospital Research Council  
1999- BWH Advisory Committee to the Office of Women's Careers  
2000- Women's Health Leadership Forum  
2003- BWH Research Service Improvement Committee  
2002- Faculty Advisor, Research Fellows' Poster Days

**Massachusetts General Hospital Major Committee Assignments:**

1996-1999 Massachusetts General Hospital Research Council

**National and Regional Major Committee Assignments:**

1986-1990 NIH Study Section Permanent Member, Oral Biology and Medicine Committee 2  
1989-1995 US Army, Intramural and Extramural Consultant  
1989-1995 Science/Technology Committee, American Association of Tissue Banks  
1991-1992 Chairman, Peer Review Panel to the U.S. Army Medical Research and Development Command  
1991 Convener, Session-In-Depth on "Fish and Amphibia", World Congress on Cell and Tissue Culture, June 19, 1991, Anaheim, CA  
1991-1994 US FDA Dental Products Panel, Full Member  
1993-1994 American Red Cross, Committee on New Tissue Services Development  
1994 Organizing Committee, "Bone Morphogenetic Proteins: An International Conference in Honor of Marshall Urist," June 8, 1994, Baltimore, MD.  
1994-present American Red Cross, National Advisory Committee  
1994-1995 Medical Research Council of Canada, Permanent Member, Experimental Medicine Review Committee  
1995 New Investigator Research Awards Committee, Orthopedic Research Society  
1995-1999 Orthopedic Research and Education Foundation, Research Grants Committee  
1995-1999 NIH Study Section Permanent Member, Arthritis, Musculoskeletal, and Skin Diseases Special Grants, AR003  
1995-1996 Chairman, Awards Committee, American Association of Tissue Banks  
1997 Co-Chair, NIH Workshop on Bone and the Immune and Hematopoietic Systems  
1997 Chair, Bone Biology Panel, NASA Life Sciences Research  
1994-2004 Appointments as Intermittent Consultant, US FDA  
1998 Reviewer, Advanced Technology Program, NIST, US Dept of Commerce.

1999-2003	External Advisory Committee, Univ of Iowa Comprehensive Oral Health Research Center of Discovery
2000	Co-Organizer, First Scientific Workshop on Temporomandibular Joint Diseases, TMJ Association, Bethesda, MD
2001	Organizing Committee, Bone Allograft Forum, Amer Assoc Tissue Banks, Washington, DC
Mar 12, 2002	Missouri Life Science Research Capacity Contracts
Apr 20, 2002	Review Panel, General Biomedical Sciences, California Tobacco-Related Disease Research Program (TRDRP)
Mar 13, 2003	Chair and Co-Organizer, Symposium on Repair and Regeneration of Oral and Craniofacial Tissues, Annual meeting of the Amer Assoc Dental Research
May 22, 2003	US FDA Panelist, Dental Products
2003	Toxicological Profile on Fluorides, US Agency for Toxic Substances and Disease Registry, Environmental Protection Agency

#### **External Advisory Boards**

1999-	Dental Center of Excellence, University of Iowa, Iowa City, IA
2003-	University of Connecticut Exploratory Center for Frontier Medicine, Farmington, CT

#### **Memberships, Offices, and Committee Assignments in Professional Societies:**

1977-1987	Plastic Surgery Research Council
1978-	American Society for Bone and Mineral Research
1980-1984	Society for Experimental Biology and Medicine
1981-1995	American Association of Tissue Banks
1981-1985	American Elasmobranch Society
1985-1991	American Society for Cell Biology
1988-	Endocrine Society
1989-1999	International Association for Dental Research
1989-	ASBMR Reviewer of abstracts
1989-	Orthopedic Research Society
1989-1999	American Association for Dental Research
1989-1991	American Society for Zoologists
1999-2002	Council Member, American Society for Bone and Mineral Research
2001	Delegate, FASEB FY2002 Federal Funding Conference
2002	ASBMR Program Committee: Category Chair
2002	Delegate, FASEB FY2003 Federal Funding Conference
2003	ASBMR Program Committee: Category Chair
2003-2006	Chair, ASBMR Ethics Advisory Committee
2003	Delegate, FASEB FY2004 Federal Funding Conference

#### **Community Service Related to Professional Work:**

1991-1994	US FDA Dental Products Panel, Full Member
1991-1994	Boston University Undergraduate Career Advisory Committee
1991-	Boston University Annual Undergraduate Career Receptions, Biology & Chemistry
1994-1996	Chair, Boston University Undergraduate Career Advisory Committee
1996-2001	Boston University College of Arts and Sciences Alumni/ae Board
2000-	Boston University TMJ (Temporomandibular Joint Diseases) Association
May 18, 2001	Scientific Advisory Board, TMJ (Temporomandibular Joint Diseases) Association
Nov 12, 2002	Presentation to 7th and 8th grade Biology class, Ethel Walker School, Simsbury, CT

#### **Editorial Boards:**

1986-1993	Editorial board, Journal of Bone and Mineral Research
1989-2000	Editorial board, Calcified Tissue International

**Editorial reviewer for:**

Am. J Physiology - Cell Physiology,  
 Analytical Biochemistry  
 Annals of Plastic Surgery  
 Arthroscopy  
 Biomaterials  
 Blood  
 Bone  
 Bone and Mineral  
 Calcified Tissue International  
 Cancer Research  
 Cell and Tissue Research  
 Cells, Tissue, and Organs  
 Clinical Orthopedics and Related Research  
 Developmental Biology  
 Drug Investigations  
 Endocrinology  
 Experimental Hematology  
 The International Journal of Oral & Maxillofacial Implants  
 International Journal of Oral and Maxillofacial Surgery  
 Journal of Biological Chemistry  
 Journal of Biomedical Materials Research  
 Journal of Bone and Joint Surgery  
 Journal of Bone and Mineral Research  
 Journal of Cell Biology  
 Journal of Cellular Physiology  
 Journal of Clinical Endocrinology and Metabolism  
 Journal of Clinical Investigation  
 Journal of Dental Research  
 Journal of Experimental Zoology  
 Journal of Medical Primatology  
 Journal of Oral and Maxillofacial Surgery  
 Journal of Orthopedic Research  
 Kidney International  
 Laboratory Investigation  
 Metabolic Bone Disease and Related Research  
 New England Journal of Medicine  
 Peptides  
 Plastic and Reconstructive Surgery  
 Proceedings of the National Academy of Science  
 Proceedings of the Society for Experimental Biology and Medicine  
 Scanning Microscopy International  
 Science

**National Review Committees:**

1986-1990 March 1989	NIH Study Section Permanent Member, Oral Biology and Medicine Committee 2 Ad hoc NIH Study Section Member, AIDS and Related Research Review Group, ARR-5; AHR V-1
July 1991 Oct. 1992 March 1993 July 1994	Ad hoc NIH Study Section, Basic Research on Osteoporosis, RFA: AR 91-02 NIH AMS Special Grants Review Committee (SGRC) NIH AMS Special Grants Review Committee (SGRC) NASA, Human and Animal Biology (HAB 1.3)

Nov. 1994	NASA, Microgravity Biotechnology (OLMSA)
April 1995	Ad hoc NIH Study Section
July 1995	NIH SBIR Special Study Section
1995-1999	NIH Study Section Permanent Member, NIAMS Special Grants, AR003
1995-1999	Orthopedic Research and Education Foundation (AAOS) Grant Review Panel
April 1996	NIH Study Section of Temporomandibular Joint Disorders
July 1996	NASA, Bone Biology Peer Review Panel
Dec. 1996	NASA, Advanced Technology Review Panel
July 1997	NASA, Bone Biology Review Panel
Nov 1998	NIH Special Emphasis Panel (004-CCMD SEP)
June 1999	NIH Special Study Section, Biomimetics, NIDCR
2000	NASA, Chairman, Bone Biology Peer Review Panel
Nov 2000	NIH Special Emphasis Review Panel (NIAMS P30)
Feb 2001	NASA, Advanced Technology Review Panel (NRA 00-HEDS-03)
April 2001	NIH Special Emphasis Panel, NIAMS
July 2001	NIH Special Emphasis Panel, Bioengineering Research (ZRG1 SSS M01S)
Aug 2001	NIH Special Review Committee, P01, NIAMS
Jan 2002	Chair, NIH Panel ZAR1 TLB-D J2 1, NIAMS
2002-2007	Orthopedic Research and Education Foundation (AAOS) Grant Review Panel

**Site visits for various Institutes of the National Institutes of Health:**

January, 1985: R01; NIDR  
 March, 1985: SBIRG; NIDR  
 December, 1985: MAC P60; NIAMSD  
 March, 1987: MAC P60; NIAMSD  
 November, 1987: P01; NIDR  
 June, 1988: P01; NIAMSD  
 September, 1988: P01; NIDR, with service as Chairman  
 July, 1990: R01; NIAMSD, Teleconference review  
 July, 1992: R01; NIDR, Teleconference review  
 July, 1992: MAC P60; NIAMSD  
 November, 1992: SBIRG; NIDR, Teleconference review  
 December, 1992: R01; NIDR  
 December, 1992: R01; NIDR, Teleconference review  
 March, 1993: MAMDC P60; NIAMSD  
 December, 1997: GCRC, NIH  
 December, 1998: Bone Biology Core Applications, NIAMSD  
 January, 1999: SEP, P60; NIDCR

**Occasional reviewer for:**

U.S. Veterans Administration  
 U.S. Army  
 Swiss National Science Foundation  
 Canadian Medical Research Council  
 American Institute of Biological Sciences  
 Colorado Tobacco Research Program, General Biomedical Sciences Study Section  
 California Tobacco-Related Disease Research Program

**Participant in Focus Groups, including the following, among others:**

Johnson and Johnson	Monsanto	Genentech, Inc
Eli Lilly and Company	Upjohn	Cetus Corporation
Lotus Corp.	Sandoz	American Red Cross
W.L. Gore	AO/ASIF	AO North America

Mitek  
 Integra

**Attendance at Post-Graduate Courses:**

June 8-12, 1992	PCR Methods in Clinical Pathology. Center for Advanced Training in Cell and Molecular Biology, Catholic University of America, Washington, DC
June 28-July 7, 1993	In Situ Hybridization. Center for Advanced Training in Cell and Molecular Biology, Catholic University of America, Washington, DC
June 23-24, 1995	National Expert Witness and Litigation Program, Hyannis, MA
Jan 30-Feb. 2, 1996	Joint Symposium on Clinical Trials Design and Analysis on Periodontics, FDA/NIH/AAP, Bethesda, MD

**Awards and Honors:**

1973-1974	NIH Postdoctoral Fellowship
1974	King Trust Fellowship
1992	Boston University Collegium of Distinguished Alumni/ae
1992	Omicron Kappa Upsilon National Dental Honor Society
2000	Glenn Foundation Endocrinology and Aging Award to Fellow for Endocrine Society abstract
2001	George W. Hyatt Memorial Award, The American Association of Tissue Banks

**PART II: Research, Teaching, and Clinical Contributions****A. Narrative report:****1. Narrative description of research:**

Dr. Glowacki's research concerns cellular aspects of skeletal growth, repair, reconstruction, and pathophysiology. Experimental and clinical studies showed the appropriate applications of demineralized bone implants for skeletal reconstruction. Subsequent development of composite implant materials led to the design of a collagen sponge with a layer of demineralized bone powder. When human skin fibroblasts are cultured with that device, they begin to produce cartilage matrix within days. Current efforts concern the identification of the "chondrogenic master gene(s)" with this system. Studies on *in vivo* and *in vitro* chondrogenesis include transplantation of perichondrium and ongoing work on cartilage tissue engineering.

*In vivo* and *in vitro* models of osteoclast differentiation revealed the relationship between osteoclasts and macrophage polykaryons, and the importance of the bone matrix protein osteocalcin as a substrate signal for osteoclast differentiation. Defined cocultures of murine marrow stroma and hematopoietic stem cells revealed the role of, osteocalcin, M-CSF, and other stromal products in osteoclast differentiation. That work led to investigations with cultured human marrow that showed the effects of age and estrogen status on cytokine production and osteoclastogenesis. Current work focuses on effects of aging on human marrow in 3D collagen sponges.

Osteogenesis studies include biological principles underlying bone grafting, regulation of angiogenesis in bone formation, distraction osteogenesis, comparisons of fetal and post-natal bone repair, interactions between osteoblasts and implant materials, comparative skeletal and mineral metabolism in fishes, and the functions of bone extracellular matrix proteins in transgenic cells.

Abiding clinical projects include bone substitute materials, pathophysiology of giant cell lesions, natural history of hemangiomas, etiology and management of cranio-maxillofacial deformities, skeletal aging, and metabolic bone diseases.

**2. Major Research Interests:**

Cell biology of osteoclasts, osteoblasts, and chondroblasts  
Clinical use of demineralized bone in craniomaxillofacial, orthopedic, and periodontal surgery  
Regulation of bone and cartilage formation  
Regulation and mechanisms of bone resorption  
Aging and skeletal biology  
Pathophysiology of metabolic bone disease  
Osseous response to implant materials  
The mast cell as a bone cell  
Comparative skeletal and mineral metabolism  
Biology of distraction osteogenesis  
Skeletal tissue engineering

**B. Funding Information:**

**Past:**

7/1/76-6/30/79	Human Growth Foundation PI: J. Glowacki <i>Regulation in Endochondral Osteogenesis</i>
6/1/77-5/31/81	NIH PI: Co-PI with E.R. Blout <i>Polypeptide Marine Toxins</i>
10/1/82-9/30/85	NOAA Sea Grant R/MP-28 PI: Co-PI with L.B. Deftos <i>Novel Marine Biologicals in the Treatment of Human Skeletal Disease</i>
10/1/82-9/30/85	Monsanto/Harvard Grant PI: J. Glowacki <i>Demineralized Bone</i>
2/1/84-130/89	NIH R01-AR35166 Y01-05 PI: J.B. Lian <i>Osteocalcin Function in Resorption</i>
5/1/85-4/30/88	NIH P01-HD19767 Y01-03 PI: C.S. Anast, PI role assumed by Dr. Glowacki upon his death. <i>Pathophysiology and Treatment of Osteopetrosis Program Project</i>
7/1/85-6/30/88	NIH RO AR31330 Y01-03 PI: J. Glowacki <i>A Model for Studying Regulation of Bone Resorption</i>
10/1/85-9/30/89	Takeda Chemical Industries, Ltd. PI: J. Glowacki

*Demineralized Bone*

7/1/87-6/30/92	NIH P01-CA 45548 Y01-05 PI: J. Folkman <i>Regulation of Angiogenesis Program Project</i>
7/1/88-6/30/92	NIH R01-AR31330 Y04-08 PI: J. Glowacki <i>A Model for Studying Regulation of Bone Resorption</i>
12/1/88-11/30/93	NIHR01-DE08798 Y01-05 PI: J.S. Greenberger with subcontract to J. Glowacki <i>Role of Marrow Stroma in Osteoclast Differentiation</i>
9/30/90-9/29/93 NIH	RR06672 Y01-03 PI: L. Kaufman with subcontract to J. Glowacki <i>Mechanisms of Bone Growth in Fish Hyperostosis</i>
12/1/94-1/31/98 NIH	R01-DE08798 Y06-08 PI: J. Glowacki with Subcontract to J.S. Greenberger <i>Role of Marrow Stroma in Osteoclast Differentiation</i>
3/1/95-2/28/97	Oral and Maxillofacial Foundation PI: L. Kaban and J. Glowacki <i>Mechanisms of Fetal and Postnatal Bone Repair</i>
9/30/95-3/31/97	NIH R41-DE11617 PI: J. Glowacki <i>Devices for Regeneration of Oral Osseous Tissue</i>
3/1/98-6/30/98	Molecular Geodesics PI: J. Glowacki <i>In Vitro Osteocompatibility of a Geodesic Scaffold</i>
9/1/94-8/31/98	NIH R01-AG12271 Y01-03 PI: J. Glowacki <i>Marrow Biology and Bone Mass: Effects of Age and Hormones</i>
1/1/98-12/31/99	Johnson & Johnson PI: J. Glowacki <i>Effects of Implant Materials on Bone Formation</i>
5/1/98-12/31/99	Nabisco PI: J. Glowacki <i>Effects of Macronutrients on Chondrocyte Metabolism</i>
4/1/94-3/31/00	NIH R01-AR43434-01 PI: L. Gerstenfeld with subcontract to J. Glowacki <i>Transgenic Osteoblasts to Examine ECM Functions</i>
9/30/95-9/29/00	NIH R01-AG13519 PI: J. Glowacki <i>Effects of Age and Hormones on Bone Marrow Biology</i>
7/1/96-6/30/02	AO/ASIF Foundation PI: L. Kaban and J. Glowacki

*Synthes Fellowship Stipend*

7/1/97-12/31/01	AO/ASIF and Synthes USA PI: L. Kaban and J. Glowacki <i>Distraction Osteogenesis in the Porcine Mandible</i>
4/1/98-3/31/02	Oral and Maxillofacial Surgery Foundation Program Director: J. Glowacki <i>Dental Student Research Training Award</i>
1/1/99-12/31/01	Merck Medical School Grants Program, US-55 PI: J. Glowacki <i>Effects of Alendronate &amp; Estrogen on Human Bone Marrow Cells</i>
7/1/99-6/30/01	BWH Multidisciplinary Grant PI's: M. LeBoff, J. Wright, J. Glowacki <i>Vitamin D Status and Therapy in Postmenopausal Women with Fractures of the Distal Radius</i>
7/1/98-6/30/02	NIH R01 AR44873 PI: J. Glowacki <i>Mechanisms of Chondroinduction of Human Dermal Fibroblasts</i>
<b>Current:</b>	
9/1/98-8/31/04	Department of Defense PI: M. LeBoff <i>Effects of DHEA on Bone in Young Adults</i>
9/1/98-8/31/04	NIH R01 AR45870 PI: D. Zaleske through 8/01 PI: J. Glowacki beginning 8/01 <i>Tissue Engineering of Growing Joints</i>

Report of Current Research Activities:

Project	Role
Mechanisms of Chondroinduction of Human Dermal Fibroblasts	Principal Investigator
Tissue Engineering of Growing Joints	Principal Investigator
Mechanisms Underlying Age Related Bone Loss:	Principal Investigator
Role of the Bone Marrow Stromal Precursor Cells	Co-Investigator
Distraction Osteogenesis in the Porcine Mandible	Principal Investigator
Effects of Implant Materials on Bone Formation	Principal Investigator
Effects of Macronutrients on Chondrocyte Metabolism	Principal Investigator
Role of Angiogenesis in Osteogenesis	Principal Investigator
Vitamin D Status and Therapy in Postmenopausal Women with Fractures of the Distal Radius	Co-Principal Investigator

**D. Report of Teaching:**

**1. Local Contributions:**

**a) Brigham and Women's Hospital**

Oct 5, 1999 Speaker, How to write an abstract. Workshop sponsored by BWH Research Career Development Committee

Oct 7, 2002 Speaker, How to write an abstract. Workshop sponsored by BWH Research Career Development Committee

Mar 6, 2003 Distinguished Judge, BWH Research Fellows Poster Exhibition.

**b) Medical School, School of Dental Medicine Courses**

1998-present, Course Director: OR 512.23 "Problems in Osseous Reconstruction", a 4-week Advanced Biomedical Sciences Course for 4th-year Harvard Medical and Dental Students

1998-present, Harvard Combined Orthopedic Residency Selection Committee, Harvard Medical School

1998-present, Faculty, Core Curriculum, Harvard Combined Orthopedic Residency Program

April 18, 2002 Clinic and Discussion on Fracture Healing, Human Systems Module II-B

**c) Graduate Medical Courses:**

October 26, 1993, Invited Lecturer, "Comparative skeletal and mineral metabolism" Graduate Department of Physiology (Marine Biology), Boston University, Boston, MA.

September 23, 1998, Invited Lecture for Graduate School Course on Osteoporosis, "Biology and Pathophysiology of the Osteoclast", Graduate Department of Nutrition, University of Maine, Orono, ME.

February 11, 2003. Guest Lecture. ChE 194 Advanced Biomaterials and Tissue Engineering (graduate course), Department of Chemical and Biological Engineering, Tufts University, Medford, MA

**d) Invited teaching presentations, seminars, grand rounds (Local)**

September 12, 1985, Invited Lecturer, American Association of Tissue Banks, Boston, MA.

April 3, 1986, Invited Lecturer, "Bone Grafting Materials", Biogen Research Corporation, Cambridge, MA.

February 4, 1988, "The Cell Biology of Giant Cell Lesions of the Jaw", MGH Cancer Center Grand Rounds, Massachusetts General Hospital, Boston, MA.

February 24, 1988, Guest Lecturer, "Comparative Skeletal and Mineral Metabolism: From Shark to Man", New England Aquarium, Boston, MA.

October 17-21, 1988, Invited Speaker, "Third International Conference on Mineralized Tissues", Chatham, MA.

January 11, 1989, Panelist, "Communicating with the Press", Harvard Medical School, Boston, MA.

September 15, 1993, "Osseous Responses to Implant Materials", Worcester Polytechnic Institute, Worcester, MA.

May 11, 1994, Grand Rounds, "Biology of Bone Grafting", New England Baptist Hospital, Boston, MA.

September 27, 1994, Endocrine Grand Rounds, Boston University Medical Center, Boston, MA.

April 11, 1996, Seminar, "Osteoclast Differentiation", Forsyth Dental Center, Harvard School of Dental Medicine, Boston, MA.

May 11, 1996, Faculty, Dexterity Enhancement Workshop, Longwood Skull Base Program, Boston, MA.

November 6, 1996, New England Baptist Hospital Orthopedic Grand Rounds, "Osteoporosis and Bone Marrow Biology", Boston, MA.

June 3, 1998, Panelist, "What to do after your third postdoc at Harvard?", Harvard Medical School, Boston, MA

June 18, 1999, Invited Seminar, "Mechanisms of Skeletal Aging", Endocrine Unit, Massachusetts General Hospital, Boston, MA.

October 5, 1999, "How to Write an Abstract", sponsored by the BWH Research Career Development Committee, Boston, MA

January 10, 2001, Invited Speaker, "Skeletal Effects of the Adrenopause", Children's Hospital Bone Day, Boston, MA

February 20, 2002, Orthopedic Grand Rounds, "Osseous responses to old and new implant materials", MGH, Boston, MA

October 12, 2002, "How to Write an Abstract", sponsored by the BWH Research Career Development Committee, Boston, MA

**e) Continuing Medical Education courses**

January 8, 1989, Invited Faculty, "The Brookdale Maxi-Course in Oral Implantology", New York, NY.

March 15, 1990, Faculty, "The Second Annual Brookdale Maxi-Course in Oral Implantology", New York, NY.

April 12, 1991, Faculty, "The Third Annual Brookdale Maxi-Course in Oral Implantology", New York, NY.

May 1, 1991, Faculty, PMA Education and Research Institute Program on "Osteoporosis and Bone Metabolism", Boston, MA.

May 10, 1991, Faculty, The Boston Course on "Oral Implantology", Boston, MA.

April 9-11, 1992, Faculty, HMS Total Knee Replacement Course, Cambridge, MA.

May 12, 1992, Faculty, PMA Education and Research Institute Therapeutic Series: "Osteoporosis and Bone Metabolism", Boston, MA.

May 5, 1993, Faculty, PMA Education and Research Institute Therapeutic Series: "Osteoporosis and Bone Metabolism", Boston, MA.

May 4, 1994, Faculty, PMA Education and Research Institute Therapeutic Series: "Osteoporosis and Bone Metabolism", Boston, MA.

September 16, 1994, Invited Faculty, "The Sixth Annual Brookdale Maxi-Course in Oral Implantology", New York, NY.

May 16, 1995, Faculty, PhRMA Education and Research Institute: "Drug Development in Osteoporosis and Bone Metabolism", Boston, MA.

September 15, 1995, Invited Faculty, "The Seventh Annual Brookdale Maxi-Course in Oral Implantology", New York, NY.

May 13, 1996, Faculty, PERI Therapeutic Series: "Drug Development in Osteoporosis and Bone Metabolism", Boston, MA.

October 25, 1996, Faculty, "The Eighth Annual Brookdale Maxi-Course in Oral Implantology", New York, NY.

November 13, 1997, Faculty, "The Ninth Annual Brookdale Maxi-Course in Oral Implantology", New York, NY.

August 22, 1998, Faculty, Distraction Osteogenesis Course, AO/ASIF, Chicago, IL.

October 24, 1998, Faculty, "The Tenth Annual Brookdale Maxi-Course in Oral Implantology", New York, NY.

May 22-23, 1999, Faculty Lecture, "Osteotomy versus Distraction Osteogenesis", AO/ASIF Continuing Education Course on Distraction Osteogenesis, Louisville, KY.

December 18-19, 1999, Faculty Lecture "Growth factors during distraction osteogenesis", Distraction Osteogenesis Course, AO/ASIF, Chicago, IL.

December 18-19, 1999, Faculty Lecture "Effects of latency period and distraction rate on osseous healing and osteogenesis in craniofacial bones", Distraction Osteogenesis Course, AO/ASIF, Chicago, IL.

September 16, 2000, Faculty, "The Twelfth Annual Brookdale Maxi-Course in Oral Implantology", New York, NY.

December 8, 2001, Faculty, "The New York Maxi-Course in Oral Implantology", New York, NY.

October 3, 2003, Lecture "Enhancing Histogenesis for Joint Repair and Construction". Current Progress in Tissue Engineering, HMS Continuing Education, Boston, MA

**f) Advisory and Supervisory Responsibilities in Laboratory Settings**

Graduate Student Advisor  
1-2 graduate student(s) in laboratory/year

Postdoctoral Fellow Advisor  
1-3 postdoctoral fellows in laboratory/year

1979-present Harvard School of Dental Medicine; Member of Thesis Committees for Undergraduates and Fellows

1980-present Harvard School of Dental Medicine; Supervisor of Masters and Doctoral Thesis Candidates.

1988, 1993 HMS Combined Orthopedic Residency Program; Thesis Day Discussant

1993 Harvard - MIT HST; Examiner of M.D. Honors Candidates

1994, 1995 Mentor for "Project Success," a program for minority high school student professional development

**g) Leadership Roles in Teaching**

1989-1990 Chair, Longwood Vascular Biology Seminar Series, Harvard Medical School

1998-present Course Director: OR 512.23 "Problems in Osseous Reconstruction", a 4-week Advanced Biomedical Sciences Course for 4th-year Harvard Medical and Dental Students

1998-2002 Oral and Maxillofacial Surgery Foundation  
Program Director: J. Glowacki  
Dental Student Research Training Award

## Names of Advisees and Trainees

Table of Trainees

Name	Training Level	Training Period	Degree Prior to Training	Title of research project	Current Position
Pettis, Gail	M.M.Sc. (HSDM)	9/1/84-6/30/87	D.D.S.	Tissue response to ceramic and composite implants in rats	Private Practice, Orthodontics, Seattle, WA
Libert, Ellen	D.M.Sc. (HSDM)	9/1/87-6/30/89	D.M.D.	Effects of flurbiprofen on osteoclastic bone resorption	Associate Dean of Admissions and Post-Graduate Education, Harvard School of Dental Medicine, Boston, MA
Wolf, Nancy	M.D. (HST)	9/1/87-6/30/89	Ph.D.	Young bone in old fish	Associate Professor, Department of Pathology, Case-Western Reserve, Cleveland, OH
Liggett, William	D.M.Sc. (HSDM)	9/1/87-6/30/91	D.M.D.	The ontogeny of the osteoclast: the influence of hormones, growth factors, and local mediators	Associate Professor, Hematology and Oncology, Johns Hopkins School of Medicine, Baltimore, MD
Perona, Barbara	Research Fellow	7/1/90-6/30/91	M.D.	Differences in osteocompatibility of resorbable or non-resorbable calcium phosphates in rat tibial wounds	Anesthesiologist, University of Iowa Medical Center
Mizuno, Shuichi	Ph.D. (Univ. of Tskuba)	8/1/90-8/30/97	M.Sc.	Chondroinduction by demineralized bone matrix in a three-dimensional culture device	Instructor, Orthopedic Research Laboratory, Brigham and Women's Hospital, Boston, MA
Shevde, Nirupama	D.M.Sc. (HSDM)	9/1/90-6/30/92	B.D.S.	The role of microenvironmental factors in osteoclast differentiation	Assistant Professor, Children's Hospital, University of Cincinnati, Cincinnati, OH
Tasuchida, Toymitsu	Research Fellow	1/1/91-6/30/91	M.D.	Bone morphologic protein and bone ingrowth	Professor, Chiba University, Japan
Azar, Haleh	M.M.Sc. (HSDM)	9/1/93-6/30/94	D.D.S.	Regulation of macrophage colony-stimulating factor and interleukin-6 receptors in osteoclast progenitors	Orthodontic Private Practice, Boston, MA

Name	Training Level	Training Period	Degree Prior to Training	Title of research project	Current Position
Lackey, Melissa	D.M.D. (HSDM)	7/1/96-3/1/98	B.A.	Regeneration of fetal rabbit osseous wounds	Resident, Oral Surgery, MGH and Harvard School of Dental Medicine, Boston, MA
Cheleuitte, Domingo	M.D. (HMS)	6/1/97-5/1/98	B.A.	Effect of age on bone marrow cytokines	Foot/Ankle Fellow, Dallas, TX
Mueller, Stefan	Research Fellow	9/1/97-5/1/99	M.D.	Effects of age on osteogenesis by human bone marrow	Resident, Anesthesiology, University of Zurich, Switzerland
Makhluf, Huda	Post-Doctoral Research Fellow	9/1/97-10/99	Ph.D.	Effect of age on osteoclastogenesis	Research Fellow, Baylor, Houston, TX
Eid, Karim	Research Fellow	9/98-12/99	M.D.	Effects of nutrients on osteoarthritic and normal human chondrocytes	Attending Orthopedist, Trauma Surgery, University of Zurich, Switzerland
Allemann, Florin	Research Fellow	4/1/99-10/15/00	M.D.	Regulation of chondrogenesis in 3-D culture	Trauma Resident, University of Zurich, Switzerland
Gordon, Catherine	Research Fellow	7/98-9/00	M.D.	Effects of DHEA on human bone marrow	Instructor, Adolescent and Pediatric Endocrinology, Children's Hospital, Boston, MA
Rubin, David	Research Fellow	11/1/99-4/1/00	Ph.D.	Chondrogenesis in vitro	Assistant Professor, Dept of Biology, Illinois State University, IL
Simon, Josef	Medical Student (HMS)	6/1/00-6/30/01	B.S.	Effects of estrogen status on osteoblastogenesis	HMS IV
Warden, Scott	Medical Student (HMS)	6/1/00-6/30/01	B.A.	Engineered chimeric joints for mouse knee transplantation	HMS IV
Shulten, Alcuin	D.M.Sc. (HSDM)	6/1/00-	D.D.S.	Effects of nicotine on distraction osteogenesis in rats	
Singh, Parmanand	Medical Student (HMS) Prematriculation Research Fellow	6/1/01-9/1/01	B.A.	Effects of sex steroids on osteoblast differentiation	HMS I
Zhou, Shuanhu	Post-doctoral Research Fellow	11/1/01-	Ph.D.	Gene expression in engineered tissues	
Forbes, Rachael	Dental Student	3/1/02-	B.S.	Effects of age and tissue source on chondroinduction in vitro	HSDM/HST II
Wycoff, Charles	Medical Student (HMS)	6/1/02-	Ph.D.	Engineered chimeric joints for mouse knee	HMS II

Name	Training Level	Training Period	Degree Prior to Training	Title of research project	Current Position
				transplantation	
Deheshi, Benjamin	Research Fellow	9/1/02-	M.D.	Articular cartilage repair in the minipig	
Kikuchi, Masanori	Research Fellow	10/1/02-	Ph.D.	Engineered bone tissue	
Lechpammer, Stanislav	Research Fellow	4/1/03-	M.D., Ph.D.	Angiogenesis and bone formation	

**2. Regional, National, and International Contributions:**

**a) Invited Presentations**

**Regional and National Invitations**

February 18, 1983, Invited Lecture, "Experimental and Clinical Studies with Demineralized Bone Implants", Stryker Corp., Kalamazoo, MI.

March 4, 1983, Invited Orthopedic Rounds, Rhode Island Hospital, Brown Medical School, Providence, RI.

May 3-4, 1983, Invited Lecturer, NIH Workshop on "Local Mechanisms Regulating Bone Formation", NIDR, Bethesda, MD.

May 11-15, 1983, Faculty, "International Symposium on Tissue Repair", Tarpon Springs, FL.

June 5-7, 1983, Session Chairman, Bone Metabolism, Fifth Annual Meeting of the American Society for Bone and Mineral Research, San Antonio, TX.

November 19, 1983, Invited Speaker, "Basic Science Teaching Program", Brown University, Rhode Island Hospital, Providence, RI.

January 24, 1985, Invited Lecturer, American Academy of Orthopedic Surgeons, Las Vegas, NV.

January 31, 1985, Invited Lecturer, Southern California Bone Club, Irvine CA.

February 4, 1986, Symposium Speaker, "Biological Actions of Ansaid", Scottsdale, AZ.

March 7, 1986, Invited Seminar, "Comparative Skeletal and Mineral Metabolism: From Shark to Man", Scripps Institute of Oceanography, La Jolla, CA.

March 12-14, 1986, Invited Symposium Speaker, American Association of Dental Research, Washington, DC

November 18, 1986, Invited Speaker, Cetus Corporation, Emeryville, CA.

December 16-17, 1986, Invited Speaker, Kansas City Bone and Mineral Club, Kansas City, MO.

January 9, 1987, Distinguished Lecture Series, The Hospital for Special Surgery, New York, NY.

May 14, 1987, Invited Speaker, Pfizer, Inc, Groton, CT.

September 27-29, 1987, Invited Lecturer, American Association of Tissue Banks, Washington, DC

March 1, 1988, Symposium Speaker, "Biological Actions of Ansaid", Scottsdale, AZ.

May 9-13, 1988, Invited Symposium Speaker, Symposium on "Clinical Disorders of Bone and Mineral Metabolism", Detroit, MI.

July 20, 1988, Guest Lecturer, "Models for Studying Bone Metabolism", Pfizer, Groton, CT.

December 1-4, 1988, Invited Faculty, "Bone Grafting: Biology and Application for Maxillofacial Indications", San Diego, CA.

January 26-28, 1989, Invited Faculty, "Bone Grafts", Tampa, FL.

October 29 - November 1, 1989, Invited Participant, "Biological Restoration of Bone and Articular Cartilage", AAOS/NIH, Airlie, VA.

November 6, 1989, Endocrine Rounds, "Comparative Endocrine and Skeletal Metabolism", University of Indiana, IN.

May 13, 1991, Lecture, "Cellular Responses to Bone Constituents", Eli Lilly, Indianapolis, IN.

September 27, 1991, Combined Endocrine and Orthopedic Grand Rounds, St. Joseph's Medical Center, Bangor, ME.

September 27, 1991, Invited Seminar, "Comparative Skeletal and Mineral Metabolism", Dept of Zoology, University of Maine, Orono, ME.

April 30, 1993, Orthopaedic Grand Rounds, Yale University School of Medicine, New Haven, CT.

October 7-10, 1993, Invited Speaker, "Frontiers in Implant Science", The American Academy of Implant Dentistry, Annual Meeting, Dallas, TX.

October 21-22, 1993, Invited Visiting Professor, Department of the Army, Eisenhower Army Medical Center, Ft. Gordon, GA.

November 1, 1993, Invited Lecturer, "Biology of the Osteoclast", University of Arkansas for Medical Sciences, Little Rock, AR.

November 13-16, 1993, Section Leader and Speaker, AAOS/NIH Workshop on Bone Formation and Regeneration, Tampa, FL.

March 3, 1994, Invited Lecturer, "*In vitro* Assessment of Osteoinduction", American Red Cross, Holland Laboratories, Rockville, MD.

June 9, 1994, Invited Lecturer, "*In vitro* chondrogenesis by human dermal fibroblasts cultured with demineralized bone", International Conference on BMPs, Baltimore, MD.

July 22, 1994, Invited Lecturer, "Microenvironmental regulation of osteoclastogenesis", Pfizer, Groton, CT.

August 18, 1994, Invited Lecturer, "Microenvironmental regulation of osteoclastogenesis", Ligand, San Diego, CA.

October 9, 1994, Invited Speaker and Panelist, "Frontiers in Implant Science", The American Academy of Implant Dentistry, New Orleans, LA.

April 28, 1995, Invited Speaker, MTF International Symposium on Bone and Soft Tissue allografts, Washington, DC

May 5, 1995, Invited Seminar "Osseous Implantation", Department of Engineering, Brown University, Providence, RI.

September 9, 1995, Invited Speaker, Working Group on Aging and the Human Skeleton, Baltimore, MD.

May 1, 1996, Invited Lecture, "Biology of Bone Transfer", New York University Dental School, New York, NY.

October 10, 1996, Invited Presidential Lecture, "Repair and Regeneration of the Skeleton: From Shark to Man", St. Louis, MO.

October 11, 1996, Invited Seminar, "Role of Microenvironment of Osteoclast Differentiation", St. Louis, MO.

March 6, 1997, Invited Lecture, "Osteoporosis and Dental Implants", Academy of Osseointegration, San Francisco, CA.

June 4, 1997, Invited Lecture, "Differences in fetal and post-natal bone repair and responses to implants", International Conference on BMPs, Sacramento, CA.

June 5-6, 1997, Invited Lecture, "Juxtacrine Mechanisms of Osteoclastogenesis", Workshop on Bone and the Immune and Skeletal Systems, Bethesda, MD.

June 20-24, 1997, Invited Lecture, "Tissue Responses to Bone Substitute Materials", Periodontal Disease Gordon Research Conference, Henniker, NH.

October 24, 1997, Invited Lecture, "Angiogenesis and Fracture Healing", Fracture Repair Conference, AOS, Tampa, FL.

June 26, 1998, Endocrine Grand Rounds, "Mechanisms of Skeletal Aging", University of Arkansas Medical Center, Little Rock, AR.

September 19, 1998, Invited Lecture for Symposium on Tissue Engineering, "Role of Growth and Differentiation Factors in Tissue Engineering", Amer Assoc Oral Maxillofacial Surg Annual Meeting, New Orleans, LA.

October 2, 1998, Invited Lecture in Symposium on Biomaterials for the Face, American Society for Plastic and Reconstructive Surgery, Boston, MA.

October 30, 1999, "Relationships Among DHEAS, Skeletal IGF-I, IL-6, and Bone Density in Women". International Symposium on Endocrinology of Aging, Tempe, AZ

March 16, 2000, Invited Speaker, "Tissue Engineering and Musculoskeletal Repair: Outlook for the New Decade". Trends and Opportunities in the Orthopedic and Spine Surgery Market, MDI Conference, Orlando, Florida

November 29, 2000. Orthopedic Grand Rounds. "Skeletal Aging: From Bench to Bedside". University of Iowa Hospitals and Clinics, Iowa City, Iowa

March 13, 2001. Dean's Seminar. "Mechanisms of Skeletal Aging:From Bench to Bedside". MCP  
Hahnemann School of Medicine, Philadelphia, PA

March 14, 2001. Orthopedic Rounds. "Old and New Materials for Bone and Joint Reconstruction". MCP  
Hahnemann School of Medicine, Philadelphia, PA

August 28, 2001. Invited Lecture. "In Vitro Tests for Allograft Activity". 25th Annual meeting of the  
American Association of Tissue Banks, Washington, D.C.

March 19, 2002. Invited Lecture. "Histogenesis in Three-Dimensional Scaffolds". Engineering Tissue  
Growth - International Conference and Exposition, Pittsburgh, PA..

March 22, 2002. Invited Lecture. "Bioreactors for Cartilage Engineering". Stanford University Bio X  
Sponsored Symposium, Stanford, CA.

May 1, 2002. Lecture Series in Biomedical Engineering and Biosciences. "Histogenesis in Three-  
Dimensional Scaffolds." Rensselaer Polytechnic Institute, Troy, NY.

July 19, 2002. Invited Lecture. "Bone Healing in the Aged Patient". Texas Health Research Institute,  
Presbyterian Hospital of Plano Campus, Plano, TX.

Nov 21, 2002. Invited Lecture. "Histogenesis in Three-Dimensional Scaffolds". Cold Spring Harbor  
Winter Symposium on Tissue Engineering. Cold Spring Harbor, NY.

Mar 13, 2003. Invited Lecture. "RDA and Macroarrays to Identify Genes in Postnatal Chondroinduction by  
Demineralized Bone". AADR Symposium on Repair and Regeneration of Oral and Craniofacial Tissues,  
San Antonio, TX.

August 24, 2003. Invited Lecture. "Effects of Sterilants on Osteoinductivity". Annual meeting of the  
American Association of Tissue Banks, San Diego, CA,

## International Invitations

April 2-3, 1982, Invited Speaker; First International Workshop: "The Effects of Calcitonins in Man", Florence, Italy.

October 7-9, 1982, Invited Panelist, International Seminar on Calcitonin, Copenhagen, Denmark.

October 16-24, 1983, Invited Participant, VIIIth International Conference on "Calcium Regulating Hormones", Kobe, Japan.

October 19, 1983, Invited Lecturer, "Clinical and Experimental Applications of Induced Osteogenesis", Toray Industries, Tokyo, Japan.

October 24, 1983, Invited Lecturer, "Clinical and Experimental Applications of Induced Osteogenesis", Sankyo Company, Tokyo, Japan.

November 4-5, 1983, Invited Faculty, "First International Conference on Osteoporosis", Florence, Italy.

December 16-17, 1983, Invited Faculty, "International Symposium on Metabolic Bone Diseases and Calcitonin", Lisbon, Portugal.

October 2-4, 1984, Invited Faculty, "International Symposium on Calcitonin", Milan, Italy.

November 7-9, 1985, Invited Faculty, "Second International Conference on Osteoporosis", Athens, Greece.

November 2-3, 1986, Invited Faculty, "Middle East Calcitonin Symposium", Cairo, Egypt.

October 13-15, 1987, Invited Participant, "Cell and Molecular Biology of Hard Tissues", CIBA Foundation Symposium, London, United Kingdom.

September 9, 1989, Invited Speaker, "Closed Research Workshop on Calcitonin", Montreal, Canada.

September 20-21, 1990, Osteoinduction by Demineralized Bone Implants. Invited Lecturer. First European Course on "Biomaterials in Reconstructive Surgery", Venice, Italy.

December 3-4, 1990. Invited Faculty, "The Bone Biomaterial Interface", Toronto, Canada.

January 11, 1996, Lecture, "Bone Reconstruction with Natural and Synthetic Materials", Niguarda Hospital, Milan, Italy.

January 12, 1996, Panelist, "Consensus Conference on Medical, Legal, and Ethical Aspects on the Use of Synthetic Biomaterials and Tissue Engineering", University of Milan, Milan, Italy.

June 21, 1997, Lecture, "Potential roles of bone marrow stroma in human skeletal metabolism", IV Workshop on Osteobiology Conference, Salsomaggiore, Italy.

October 4, 1997, Invited Lecture, "Bone substitute materials for dental implantology", Annual Meeting of German Dental Implant Society, Wurtzburg, Germany.

January 20, 1998, Invited Lecture, NAIR Workshop on Tissue Engineering, Tsukuba, Japan.

June 5, 1999, Invited Lecture, "Role of the Bone Marrow in Skeletal Aging", Osteobiology Workshop, Gallipoli, Italy.

November 6-7, 1999, Invited Lecture, "Distraction Osteogenesis of the Porcine Mandible", AO-FORK, Zurich, Switzerland

December 2-3, 1999. Invited Lecture, "Construction and Regulation of Three-Dimensional Bone Tissue In Vitro", Bone Engineering Conference, Toronto, Canada

September 23, 2000. Meet-The-Professor. "Bone Marrow and Osteoclasts". Annual Meeting of the ASBMR, Toronto, Canada

October 20, 2002. Invited Lecture. "Angiogenesis and Fracture Healing". Annual meeting of the Consortium of Italian Orthopedic Societies, Venice, Italy

October 8, 2003. Seminar. "Distraction Osteogenesis", University of Amsterdam, Amsterdam, The Netherlands.

October 9, 2003. Invited Address. "Mesenchymal Precursor Cells and Differentiation Pathways in Bone Repair", Bone 2003, Maastricht, The Netherlands.

October 10, 2003. Oral presentation. "Effect of Nicotine on Distraction Osteogenesis", Bone 2003, Maastricht, The Netherlands.

**b) Professional and Educational Leadership Role**

1989 Task Force for Orthopedic Knowledge Update 3: Home Study Syllabus, American Academy of Orthopedic Surgeons

2003 Reviewer for Orthopedic Operating Room Manual, Second Edition, National Association of Orthopedic Nurses

## PART III: Bibliography

### Original, Peer-Reviewed Articles:

1. Glowacki Nold J, Kang AH, Gross J. Collagen molecules: distribution of alpha chains. *Science* 1970;170:1096-98.
2. Glowacki Nold J, Belsey R. Comparative studies of rat, human, and chick vitamin D binding proteins. *Fed Proc* 1973;32:917.
3. Belsey R, Clark MB, Bernat MJF, Glowacki J, Deluca HF, Potts JR. The physiological significance of plasma transport of vitamin D and D metabolites. *Amer J Med* 1974;57:50-56.
4. Kaban LB, Glowacki J, Murray JE. Repair of experimental mandibular bone defects in rats. *Surg Forum* 1979;30:519-521.
5. Mulliken JB, Glowacki J. Induced osteogenesis for repair and construction in the craniofacial region. *Plastic Reconstr Surg* 1980;65:553-559.
6. Mulliken JB, Healey NA, Glowacki J. Povidone-iodine and tensile strength of wounds in rats. *J Trauma* 1980;20:323-324.
7. Hillelson RL, Glowacki J, Healey NA, Mulliken JB. A microangiographic study of hematoma-associated flap necrosis and salvage with isoxsuprime. *Plastic Reconstr Surg* 1980;66:528-531.
8. Glowacki J, Altobelli D, Mulliken JB. The fate of mineralized and demineralized osseous implants in cranial defects. *Calcif Tissue Int* 1981;33:71-76.
9. Kaban LB, Glowacki J. Induced osteogenesis in the repair of experimental mandibular defects in rats. *J Dent Res* 1981;60:1356-1364.
10. Upton J, Sohn SA, Glowacki J. Neocartilage derived from transplanted perichondrium: What is it? *Plastic Reconstr Surg* 1981;68:166-172.
11. Glowacki J, Gross J. Self-assembly of mixtures of collagen alpha-chains. *Biochem Biophys Acta* 1981;668:216-221.
12. Glowacki J, Kaban LB, Murray JE, Folkman J, Mulliken JB. Application of the biological principle of induced osteogenesis for craniofacial defects. *Lancet* 1981;(I):959-963.
13. Mulliken JB, Glowacki J, Kaban LB, Folkman J, Murray JE. Use of demineralized allogenic bone implants for the correction of maxillocraniofacial deformities. *Ann Surg* 1981;1974:366-372.
14. Mulliken JB, Glowacki J. Hemangiomas and vascular malformations of infants and children: a classification based on endothelial characteristics. *Plastic Reconstr Surg* 1982;69:412-420.
15. Glowacki J, Mulliken JB. Mast cells in hemangiomas and vascular malformations. *Pediat* 1982;70:48-51.
16. Holtrop ME, Cox KA, Glowacki J. Cells of mononuclear/phagocytic system resorb implanted bone matrix. *Calc Tissue Int* 1982;34:488-494.
17. Kaban LB, Mulliken JB, Glowacki J. Treatment of jaw defects with demineralized bone implants. *J Oral Maxillofacial Surg* 1982;40:623-626.

18. Glowacki J, Deftos LJ, Mayer E, Norman AW, Henry H. Calcium-regulating hormones and skeletal metabolism in sharks. *Calcif Tissue Int* 1982;34:S22-23.

19. Healey NA, Mulliken JB, Glowacki J. Studies of rat calvarial regeneration. *Surg Forum* 1982;33:574-575.

20. Glowacki J. Studies on the regulation of bone synthesis and bone resorption. *Prog Clin Biol Res* 1982;101:83-91.

21. Sonis ST, Kaban LB, Glowacki J. Clinical trial of demineralized bone powder in the treatment of periodontal defects. *J Oral Med* 1983;38:117-121.

22. Glowacki J, Trepman E, Folkman J. Cell shape and phenotypic expression in chondrocytes. *Proc Soc Exp Biol Med* 1983;172:93-98.

23. Glowacki J. The effects of heparin and protamine on resorption of bone particles. *Life Sciences* 1983;33:1019-1024.

24. Shafer DM, Kaban LB, Glowacki J, Walker PS. Physical properties of demineralized bone implants in rat subcutaneous pouches. *J Dental Res* 1983;62:195-196.

25. Finn MC, Glowacki J, Mulliken JB. Congenital vascular lesions: clinical application of a new classification. *J Pediatr Surg* 1983;18:894-900.

26. Upton J, Boyajian M, Mulliken JB, Glowacki J. The use of demineralized xenogeneic bone implants to correct phalangeal defects: a case report. *J Hand Surg* 1984;9A:388-391.

27. Lee AK, Von Beuzekom M, Glowacki J, Langer RS. Inhibitors, enzymes, and growth factors from shark cartilage. *Compar Biochem Physiol* 1984;78B:1223-1226.

28. Lian JB, Tassinari M, Glowacki J. Resorption of implanted bone prepared from normal and warfarin-treated rats. *J Clin Invest* 1984;63:998-1002.

29. Kaban LB, Glowacki J. Augmentation of the rat mandibular ridge with demineralized bone implants. *J Dental Res* 1984;63:998-1002.

30. Mulliken JB, Kaban LB, Glowacki J. Induced osteogenesis: The biological principle and clinical applications. *J Surg Res* 1984;37:487-496.

31. Glowacki J, O'Sullivan J, Miller M, Wilkie DW, Deftos LJ. Calcitonin produces hypercalcemia in leopard sharks. *Endocrinology* 1985;116:827-829.

32. Glowacki J, Mulliken JB. Demineralized bone implants. *Clin Plastic Surg* 1985;12:223-41.

33. Dethlefsen SM, Mulliken JB, Glowacki J. An ultrastructural study of mast cell interactions in hemangiomas. *Ultrastruct Path* 1986;10:175-183.

34. Glowacki J, Cox KA, O'Sullivan J, Wilkie DW, Deftos LJ. Osteoclasts can be induced in fish having an acellular bony skeleton. *Proc Natl Acad Sci (USA)* 1986;83:4104-4107.

35. Glowacki J, Cox KA. Osteoclast features of cells that resorb bone implants in rats. *Calcif Tissue Int* 1986;39:97-103.

36. Glowacki J, Jasty M, Goldring S. Comparison of multinucleated cells elicited in rats by particulate bone, polyethylene, or polymethylmethacrylate. *J Bone Mineral Res* 1986;1:327-331.

37. Glowacki J. Cartilage and bone repair: experimental and clinical studies. *Arthroscopy* 1986;2:169-173.

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